Amendments to the Drawings:

Please replace sheets 1, 2 and 4 of the drawings with the attached replacement sheets 1, 2 and 4. The replacement sheets incorporate the desired changes to the specification (i.e., "TP" instead of "PT") in the drawings, and each sheet includes all of the figures that appeared on the immediately prior version of that sheet.

Attachment: 3 Replacement Sheets

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Remarks:

The above amendments and these remarks are responsive to the Office action dated July 24, 2006. Claims 1-32 are pending in the application. In the Office action, the Examiner rejected claims 1-16, 18-23, 25-32 under 35 U.S.C. § 102(b) as anticipated by Kynor et al. (U.S. Pat. 5,603,321, hereinafter Kynor) or, in the alternative, under 35 U.S.C. § 103(a) as obvious over Kynor in further view of Stadler (U.S. Pat 6,324,421, hereinafter Stadler). Claims 17 and 24 are rejected under 35 U.S.C. § 103(a) as obvious over Kynor. The Examiner rejected claims 6, 8, 16-18 and 20 under 35 U.S.C. § 112 for being indefinite and lacking antecedent basis.

The Examiner objected to the term "PT" as being a different term from that which is generally accepted in the art to which this invention pertains.

Applicant respectfully traverses the rejections, and asserts that the rejected claims are 1) not anticipated or obvious in view of the cited art, 2) are definite and 3) are supported by the specification as filed.

Nevertheless, to expedite prosecution of the present application to issuance of a patent, and to more particularly point out selected aspects of the claims, the applicant has amended claims 1-10, 12-25 and 27-32.

Furthermore, the applicant has presented arguments showing that independent claims 1, 10, 16, 22 and 27, and those claims depending therefrom, are definite, are supported in the specification as filed, and are not anticipated or obvious in view of the cited art. Accordingly, in view of the amendments above, and the remarks below, the

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applicant respectfully requests reconsideration of the application under 37 C.F.R. §

1.111 and allowance of the pending claims.

Rejections under 35 U.S.C. § 102(b)

Waveform Referencing

The Examiner rejected claims 1-16, 18-23 and 25-32 under 35 U.S.C. § 102(b)

as being anticipated by Kynor. Kynor discloses removal of an artifact component from a

recorded digital magnetocardiography signal. Kynor teaches identifying an isoelectric

section of the cardiograph signal and approximating the magnitude of the artifact using

the magnitude of the isoelectric section. A series of isoelectric values are used to

create a model of the artifact as a time series curve. These time series values of the

artifact model are then subtracted point by point from the recorded cardiograph signal.

The Examiner rejected independent claim 1 on the grounds that Kynor teaches a

method for applying a reference value to a signal which includes each and every

element of the claim. Applicant interprets Kynor's disclosure in a significantly different

manner and respectfully disagrees with the Examiner.

Amended claim 1 recites:

A method for applying a reference value to an electrocardial waveform including
a series of heart beats, the method comprising:

identifying a triggering event within the electrocardial waveform;

waiting a period of time after the triggering event for an interval of relative
inactivity in the waveform;

sampling the electrocardial waveform during the interval of relative inactivity to
provide a sample voltage value corresponding to a selected beat; and

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> dynamically referencing the electrocardial waveform to the sample voltage
>
> value over a period of the selected beat.

Support for the revisions to claim 1 may be found throughout the specification as filed, at least at page 5, line 19 through page 6 line 2, and at page 4, line 23 through page 5, line 10.

In sharp contrast, Kynor teaches (at column 5, line 63):

> To obtain a noise-corrected or true time-series heart signal, the time-series
>
> artifact curve or Fig. 6 is subtracted on a point-by-point basis from the time-series
>
> measured heart output signal...

Kynor is subtracting values of an artifact curve from stored and digitized waveform values. This process is different and distinct from "dynamically referencing the electrocardial waveform to the sample voltage value over a period of the selected beat." Kynor does not teach referencing the waveform to the sample voltage over a beat period. Kynor also does not teach referencing the waveform dynamically.

Claims 10 and 30 use similar or identical language to claim 1, and thus are distinguished for at least the same reasons.

Waveform Features

The Examiner rejected independent claim 27 on the grounds that Kynor teaches a triggering event of a waveform that includes first and second features, and anticipates each and every element of the claim. Applicant interprets Kynor's disclosure in a significantly different manner and respectfully disagrees with the Examiner.

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Claim 27 as amended states:

A computer-readable media having computer-readable instructions thereon, which, when executed by a computer, cause the computer to execute a method for synthesizing a reference value for an electrocardial waveform, the method comprising:

identifying a triggering event within the electrocardial waveform;

sampling the electrocardial waveform during an the interval of relative inactivity; and

referencing the electrocardial waveform to the sample;

wherein the triggering event includes a first and a second feature of the electrocardial waveform.

Kynor teaches using an isoelectric interval value of a waveform to form an artifact curve. The interval is located in relation to a peak such as the T peak or the R peak. Kynor never teaches using more than one waveform feature to locate the isoelectric interval. Claims 4, 5, 13, 25 and 31 all include similar or identical language to claim 27, and thus are distinguishable form Kynor for at least the same reasons given herein.

Amplifier/Voltage Generator

The Examiner rejected claim 16 on the grounds that Kynor teaches a voltage generator for applying a voltage to a signal, and has anticipated each and every element of the claim. Claim 16 as amended recites:

A device for recording an electrocardial waveform, comprising:

at least one input for receiving a signal from an electrode, the signal representing an electrocardial waveform;

a sampling element to digitize the received signal;

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a memory element coupled to the at least one input, that stores the digitized

signal;

a processor, coupled to the memory, and configured to:

identify a peak value of the received signal; and

determine a voltage value of the received signal during an interval of relative inactivity,

the interval located relative to the peak value; and

a reference voltage generator for generating a voltage applied to the

incoming signal substantially equal to the determined voltage value.

The Examiner states that Kynor discloses a voltage generator at Col. 5, lines 44-

62. It is submitted that this paragraph of Kynor discusses how the artifact curve is

developed, **not** how a voltage generator generates a voltage. Kynor digitizes the

cardiac signal in a first process, and all subsequent operations are digital operations. In

sharp contrast to the Examiner's assertion, applicant submits that Kynor does not teach

or disclose a voltage generator of any sort.

Claims 7, 8, 10 and 22 recite similar language for reference and ground voltages,

and thus are distinguished for at least the same reasons. In each case, Kynor does not

recite any reference voltages and does not anticipate these features. Kynor works with

digital waveforms exclusively and does not manipulate the signal or generate any

voltages.

For at least the foregoing reasons, claims 1, 10, 16, 22 and 27 are not

anticipated by Kynor. Accordingly, it is submitted that these claims are in a condition

suitable for allowance. Dependent claims 2-9, 11-15, 18-21, 23, 25-26 and 28-32 are

distinguishable from Kynor for at least the same reasons.

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Rejections under 35 U.S.C. § 103(a)

The Examiner rejected claims 1-16, 18-23, 25-32 under 35 U.S.C. § 103(a) as being obvious over Kynor in further view of Stadler. Stadler teaches an adaptive filter that can be used to filter electrocardiogram information and make it available for determining physiological conditions. The Examiner suggests that although Kynor focuses on magnetocardiography signals, Stadler teaches shift of an electrocardiogram signal. The Examiner concludes that it would have been obvious to combine these references and use the manipulation techniques of Kynor on an electrocardiogram signal.

Applicant respectfully disagrees. As noted above, Kynor is different and distinct from the applicant's invention as defined the claims, and does not anticipate all of the features recited in applicant's claims. It is submitted that the teachings of Stadler do not supply the deficiency of Kynor. Furthermore, there is no motivation to combine Stadler and Kynor. Stadler does not teach manipulation of a waveform. Stadler teaches setting parameters for the application of closed loop therapies associated with an implanted medical device. Isoelectric interval data points are "used to determine if the samples collected for this cardiac cycle are acceptable from a noise standpoint or should be discarded." The isoelectric datapoints are not referenced to the waveform.

Kynor teaches the determination of a non-isoelectric artifact curve that is subtracted from the time series signal. Kynor and Stadler teach different processes and different objectives. There is no motivation to combine Kynor and Stadler.

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Even if Stadler and Kynor were combined, the cited references still would not anticipate all of the claim features of this application. The references alone or combined still would not teach "dynamically referencing the electrocardial waveform to the sample voltage value over a period of the selected beat," as recited in claim 1.

Amplifier

The Examiner rejected claims 17 and 24 under 35 U.S.C. § 103(a) as being obvious over Kynor. Claim 17 recites "an amplifier that subtracts the generated voltage from the at least one received input signal." The Examiner also suggests that the use of an amplifier is an obvious matter of design choice to a person of ordinary skill in the art.

Again, Kynor does not teach nor disclose any analog circuit elements. Kynor does not teach any modifications to the cardiac signal other than digitizing the signal. Kynor is not modifying the received input signal, but rather a digitized and stored version of the signal. It is submitted that using an amplifier to modify a digitized signal would not be an obvious design choice in view of the teachings of Kynor.

The Examiner suggests that the applicant has not disclosed that the amplifier provides a specific advantage or solves a specific problem. The application recites at page 6, line 15:

> Although the subtraction function could be performed almost entirely by way of processor 140, without the use of amplifier 95, performing the subtraction in the analog domain maintains the input signal within the linear range of the amplifier.

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This clearly explains that the amplifier was selected for the specific advantage of maintaining the signal within the specified range of the amplifier. The amplifier was not arbitrarily selected, nor was it an obvious matter of design choice.

Again, as discussed above, Kynor neither teaches nor discloses any analog circuit elements. Kynor does not teach any modifications to the cardiac signal other than digitizing the signal. As such, it is submitted that claim 17 is not rendered obvious by Kynor, either alone or in combination, and is patentable over the art of record.

Negative Peak

Claim 24 as amended recites using a negative peak as a waveform feature in a receiver with analog means and digital means. The Examiner suggests it would have been obvious to a person of ordinary skill in the art to use a negative peak as a trigger, and that the applicant has not cited a specific advantage to using the negative peak.

Applicant respectfully disagrees with the Examiner. Claim 24 depends from claim 22, which recites elements (e.g., analog means) not taught, suggested or rendered obvious in view of Kynor (for the reasons previously described herein). As such, it is submitted that claim 24, through its dependency from claim 22, is also not taught, suggested, or rendered obvious in view of Kynor.

For at least the foregoing reasons, it is submitted that claims 1, 10, 16, 22 and 27 are not obvious in view of Kynor. Nor are these claims obvious in further view of Stadler. Accordingly, it is submitted that these claims are allowable. Claims 2-9, 11-15, 17-21, 23-26 and 28-32 depend from these claims and are distinguished for at least the same reasons.

Specification Objection

The Examiner required the applicant to provide a clarification of the use of the terminology "PT", rather than the standard terminology "TP." Replacement drawings referenced above incorporate use of the reference "TP" in place of "PT." Three paragraphs of the specification are similarly amended.

Rejection under 35 U.S.C. § 112

The Examiner rejected claims 6, 8, 16-18 and 20 for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The claims have been amended to address the cited rejection. As such, it is submitted that the rejections under 35 U.S.C. 112 have been traversed and overcome.
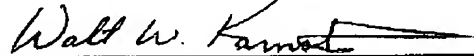
Conclusion

The cited references have failed to teach or suggest all of the claimed features. Accordingly, for at least the foregoing reasons, applicant requests that the Examiner withdraw the rejection of claims 1-32.

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Applicant believes that this application is now in condition for allowance, in view

of the above amendments and remarks. Accordingly, applicant respectfully requests

that the Examiner issue a Notice of Allowability covering the pending claims. If the

Examiner has any questions, or if a telephone interview would in any way advance

prosecution of the application, please contact the undersigned attorney of record.
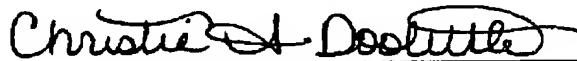
Respectfully submitted,

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CERTIFICATE OF FACSIMILE TRANSMISSION

I hereby certify that this correspondence is being facsimile transmitted to Examiner R. Holmes, Group Art Unit 3762, Assistant Commissioner for Patents, at facsimile number (571) 273-8300 on November 24, 2006.

Christie A. Doolittle

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